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## NOTES AND LITERATURE.

### GENERAL BIOLOGY.

**Mechanism and Vitalism.** — Under the title of *Mechanismus und Vitalismus*, Prof. O. Bütschli has published in brochure form his address before the International Zoölogical Congress which met in the summer of 1901 in Berlin. Bütschli points out that the modern thinkers and investigators who stand for the doctrine of vitalism, and who are often referred to as "Neovitalists," do not in reality uphold anything fundamentally new, since there is no important distinction between the old and the new vitalism. Both the old and the new doctrine rest on the assumption that life and life-processes cannot be understood, or at least not entirely understood, except as the outcome of a special principle, or force, or of a "peculiar something," which is not present in inorganic or rather dead substances. The new doctrine of vitalism goes further, perhaps, in maintaining that the purely causal mechanical point of view of living phenomena is also as correct as the teleological, but even this is not a real departure from the older view, since the latter also expressed itself causally in the sense that the postulated vital force, that was supposed to account for the phenomena of life, acted according to the causal formula.

Bütschli begins by defining as briefly as possible his own general standpoint in regard to the theory of knowledge. A few pages are given up to the discussion of the *Ego* and the *Object*. It is not clear why the author should introduce his subject by such a thread-worn metaphysical discussion, which is likely, in our opinion, to discourage and disappoint the reader at the start, but the mantle of metaphysics falls on the seventh page, and the author returns to his real theme.

Bütschli states that by "mechanism," as applied to the organism, he does not mean simply the kind of mechanics that deals with motion and with equilibrium, but rather the conception of the organism on the bases of regular sequence of cause and effect in the same way in which we account for inorganic changes. "A purely mechanical conception is impracticable even in inorganic phenomena."

There follows an explanation of that most evasive of German words, "Auslösung," and its relation to causal phenomena. Bütschli then

proceeds to give a neat and convincing account of what is meant by a "descriptive" science and points out how a number of modern critics have misinterpreted the term. In their desire to show that all science is only descriptive they have failed to discriminate between orderly sequences, such as night following day, and necessary sequences, such as the explanation of the alternation of night and day as the outcome of the revolution of the earth on its axis, etc.

After discussing whether the simplest organisms — bacteria for instance — might be accounted for as the outcome of a physico-chemical accident, Bütschli asks: If this is possible, can the same assumption account for the highly complicated organism? This leads to a discussion of what is meant by "chance" or "accident." Bütschli points out that one of the chief peculiarities of living things is their power of reproducing other living things like themselves, so that if a given form once arose by chance, its continuation does not any longer depend on chance, since by its own nature it reproduces that special group of "accidents" that brought it into existence. The argument leads naturally enough to Darwin's hypothesis of the origin and survival of chance variations. Bütschli affirms his belief that up to the present no better hypothesis has been advanced to explain the adaptation of organisms to their environment. There follows an admirably clear analysis of what we mean by adaptation. It would lead too far to enter into this discussion, but we cannot refrain from expressing great admiration for the clearness and ability with which the subject is handled.

Pflüger's "teleological causal law" is skillfully divested of its metaphysical covering. Bütschli points out that the same law is equally applicable to a steam engine with a regulator. Cossmann's recent argument, in which he attempts to demonstrate a special "biological" sequence of causes and effects in organisms as contrasted with the sequence in the inorganic world, is severely criticised and its fallacy exposed.

Bütschli points out that Driesch's demonstration of vitalism rests on a very doubtful assumption. If it could be shown, as Driesch claims, that the reorganization of a piece of an egg or of an adult into a new whole with proportionate parts is a phenomenon peculiar to living things, then Bütschli admits that Driesch might make good his position, but that this is true is by no means proven to be the case. As a parallel inorganic phenomenon it is pointed out that a drop divided in two forms two new drops. Again, if a drop of some

substances is drawn out into a cylindrical thread, the latter will, under certain conditions, break up into a series of drops of definite size and of definite distances from each other. If two such cylindrical threads of unequal size are treated in the same way, they will form drops proportionate to the original sizes of the threads, etc. Here Bütschli claims we find an analogy to the tripartite division of the archenteron of the gastrula of the sea urchin. I may add that a still more striking parallel is to be found in the behavior of the "fluid crystals" described by Lehmann. If a portion of one of these is pinched off, it shows from its optical behavior that it has assumed the crystal condition characteristic of the original whole.

Bütschli concludes: The old and the new vitalism alike emphasize the presence of the unsolved riddles of biology and express a doubt as to their solution on mechanical principles. They teach us nothing about the organism, since the very premises of the vitalistic argument rest on the assumption of an ultimate orderly action that is in itself beyond our comprehension. Therefore, we may well say that we can only grasp those parts of the phenomena of life that we can interpret by means of physico-chemical principles. T. H. M.

**Biometrika**, "a journal for the statistical study of biological problems," makes its first appearance with the number for October, 1901. Its aim is to serve "as a means of collecting under one title biological data of a kind not systematically collected or published in any other periodical," and of spreading such a knowledge of statistical theory as may be requisite for scientific treatment of the data collected. The editors are "in consultation with Francis Galton," Professors W. F. R. Weldon, Karl Pearson, and C. B. Davenport. *Biometrika* is published in Cambridge, England, at the University Press, a sufficient guarantee that the excellent form given to the initial number will be maintained. An excellent portrait of Darwin, from the Pinker statue at Oxford, forms the frontispiece. An editorial by Francis Galton is followed by papers by Professor F. Ludwig, Miss M. Beeton, and Professors Karl Pearson, W. F. R. Weldon, and other well-known students of variation.